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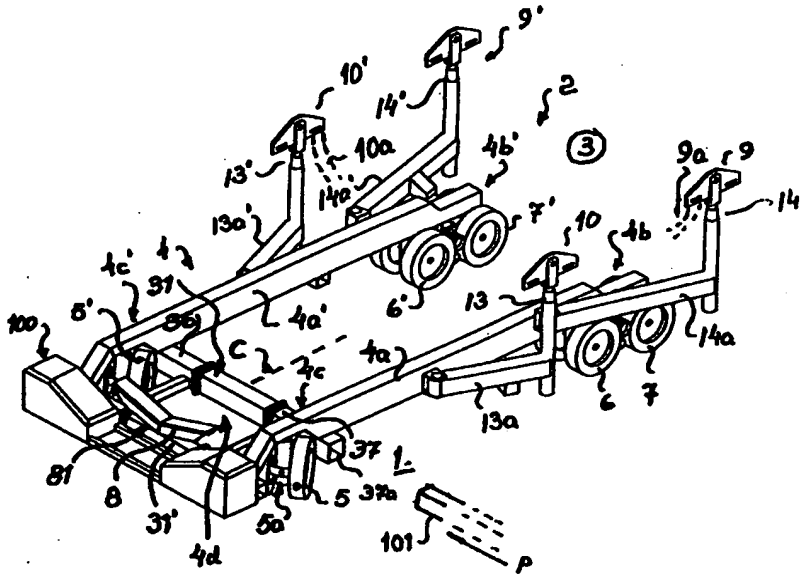


(57) Abstract

The present invention relates to a boat wagon or boat transporter (2) which can be pushed or moved along an underlying support surface (1) and which includes a frame structure (4), a number of wheels (5, 6, 7) co-acting with said frame structure, support means for supporting the forward part of the boat, and support means (9) for supporting the stern part of said boat. The support means (8) for supporting the forward part of the boat can be moved sideways, and the support means (9) for supporting the stern part of the boat can be raised and lowered. A centrally located part (4d) comprises a number of sub-parts (31, 36, 37) which can be mutually coupled together with the aid of means to this end, so as to adjust the width of the wagon to a span suitable for road transport or to a span suitable for boat transport.

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10 **TITLE OF INVENTION: BOAT WAGON**

**FIELD OF INVENTION**

According to one aspect, the present invention relates to a
15 method of adjusting the horizontal distance or span between the legs of a U-shaped boat transporter, hereinafter referred to generally as boat wagon, that includes two legs and a part which interconnects the front parts of said legs.

20 According to a second aspect, the present invention relates to a boat wagon with which the horizontal distance between the legs, or the leg span, can be adjusted and fixed to a wagon width suited for road transport and to a wagon width suited for boat transport.

25

More specifically, the invention relates to a wagon which can be pushed along an underlying supporting surface by a vehicle or moved along said surface by machinery installed to this end, and even more particularly to a boat wagon intended especially
30 for transporting boats over short distances, such as from a position in which the boat floats in water to a trestle structure on land, or vice versa. The boat wagon is also sometimes referred to as a trailer.

35 The invention particularly relates to a two-axle or multi-axle wagon which includes a frame structure, a number of wheels co-

acting with said frame structure, at least one support means for supporting the forward part of the boat, and one support means for supporting the rear part of the boat.

It will be noted that by the term "axle" as used here and in the following description includes both a single axle and a bogie.

The present invention can be seen as a further development of the boat wagon illustrated and described in Swedish Patent Application 97 01221-5.

## DETAILED DESCRIPTION OF THE BACKGROUND ART

Various types of wagons or trailers that are adapted to transport boats over short distances and which can be pushed or moved along an underlying support surface are known to the art.

One such wagon or trailer is illustrated and described in Swedish Patent Publication SE-C1-501 759, which clearly defines the earlier standpoint of techniques in the present regard.

With respect to features associated with the present invention, it should be mentioned that boat wagons that include a U-shaped frame structure with which the horizontal distance between the legs can be adjusted to correspond to the width of a boat are known to the art.

In this regard, it is known to include at the front part of respective legs a glide sleeve which is heavily dimensioned to accommodate torsional stresses and slideable along a cross beam which functions to interconnect said legs.

The length of the cross-beam is adapted to the greatest width or span between the legs.

Also known to the art are boat transport wagons that are equipped with a number of lashings for securing the hull of a boat to the wagon. Boat transport wagons that have fixed support points for holding the hull of a boat to the wagon.

## SUMMARY OF THE INVENTION

### TECHNICAL PROBLEMS

When taking into consideration the technical deliberations that a person skilled in this particular art must make in order to provide a solution to one or more technical problems that he/she might encounter, it will be seen that on the one hand it is necessary initially to realise the measures and/or the sequence of measures that must be undertaken to this end, and on the other hand to realise which means is/are required in solving one or more of said problems. On this basis it will be evident that the technical problems listed below are highly relevant to the development of the present invention.

When considering the present state of the art, as described above, it will be evident that a technical problem resides in providing structural details with the aid of simple means that will enable the legs of the U-shaped frame structure of a trailer or boat wagon, by all means of the kind defined in the introduction, to be adjusted to different spans, for instance to a narrow span at which the wagon can be moved conveniently along a road, such as along narrow road sections, and a broader span at which the wagon can stably transport broad boats.

Another technical problem is one of realising the benefits that are obtained when the leg-interconnecting member comprises several sub-parts or is telescopic so as to enable one and the same boat wagon to be adapted to a smallest width suitable for road transport to a width and configuration suitable for transportation of a given boat construction.

In addition, a technical problem resides in creating to this end conditions which will enable the leg-interconnecting member of the frame construction to be comprised of several sub-parts without deleteriously affecting the requisite mechanical strength and torsional rigidity of the leg-interconnecting member and without needing to provide glide sleeves for said legs.

With regard to the aspect of flexural rigidity, a further technical problem is one of allowing the leg-interconnecting member to consist of at least a number of readily removable sub-parts, so as to enable said leg-interconnecting member to be adjusted to a length that corresponds to the chosen distance between said legs.

Another technical problem is one of dimensioning said leg-interconnecting member and its sub-parts with requisite coupling means such that said sub-parts will exhibit a torsional rigidity and mechanical strength adapted to the construction of the boat wagon and dimensioned for a chosen maximum displacement or boat weight and/or weight distribution.

Yet another technical problem is one of realising the significance of providing mutually opposite end sections of a removable sub-part with first coupling means adapted for co-action with corresponding second coupling means belonging to adjacent leg-related sub-parts of said leg-interconnecting part, and to mutually adapt said second corresponding coupling means to form corresponded coupling means therebetween.

Another technical problem in respect of boat wagons of the kind in question resides in providing conditions with the aid of simple means such that each leg and associated wheels will be balanced as a unit and therewith be able to rest on an underlying surface without tipping.

Another technical problem with a boat wagon of the kind in question is one of providing conditions with the aid of simple means such that telescopically-related rods can extend parallel with said leg-interconnecting member or such that the interconnecting member can be formed telescopically.

Another technical problem with boat wagons of the kind concerned resides in the provision of conditions with the aid of simple means such that released or non-secured legs can be moved closer together or further apart with the aid of said steerable wheels and drive means constructed to this end.

Still another technical problem with boat wagons of the kind concerned resides in the provision of conditions with the aid of simple means that allow the leg-interconnecting member to be comprised of at least two parallel beam-sections of which each is provided with one or more readily removed sub-parts or, alternatively, are telescopically related.

When considering the prior state of the art as described above, it will be seen that a technical problem also resides in providing a simple construction for a two-axle wagon or trailer of the aforedescribed kind that cannot only be used to transport boats reliably with the aid of support straps or the like in a simple fashion, essentially regardless of the shape of the hull of the boat, but which will also enable the boat's attitude in relation to its horizontal plane to be readily adjusted, generally independently of the position or the status of the

wagon at that moment in time, therewith enabling the position of the boat relative to the horizontal plane to be kept more or less constant despite pronounced changes in the attitude of the wagon as a result of moving up and down in the water or moving along a sloping or irregular surface and also of providing conditions in which each of two support means is able to utilize a respective rotatable or pivotal arm to move a support strap or belt up and down in a plane, or adjacent to a plane, which extends perpendicularly to the frame structure, whilst the keel of the hull is able to rest on a support plate.

It will also be seen that a technical problem resides in realising the advantages that are afforded when the support plate is mounted on a part of a leg-interconnecting member and is arranged for movement solely horizontally in the longitudinal extension of said interconnecting member, so as to enable the most forward part of the hull of said boat to be moved sideways when adjusting the position of the hull with one or both of said support straps.

Another technical problem is one of realising the significance of and the advantages afforded by allowing the forward part of the boat wagon to be raised and lowered through the medium of piston-cylinder devices active between the forward steerable wheels and the wagon frame-structure.

In the case of this latter application, another technical problem is one of realising the benefits that are afforded when the side-mounted piston-cylinder devices are connected in parallel so that the two such devices will generate mutually identical pressure forces on the one hand and provide a pendulating function on the other hand, so as to compensate for irregularities and unevenness in the surface on which the wagon is supported.

## SOLUTION

With the intention of solving one or more of the aforesaid technical problems, the present invention takes as its starting point a wagon or trailer of the aforesaid construction that can be pushed or moved along an underlying surface supporting said wagon.

The invention relates to a method of adjusting the distance between the legs of a U-shaped boat wagon to a span suitable for road transport and to a span suitable for boat transport.

The invention also relates to a boat transport wagon where the leg-interconnecting member is a multi-part structure in which the parts removably co-act with each other and/or co-act telescopically with each other, where one or more removed parts and/or telescopically compressed parts result in a span between the legs and therewith a wagon width that is suitable for road transport, and where one or more additional parts fitted to said member and/or a part or parts telescopically extended from a telescopic member will result in a leg span suitable for boat transport.

According to proposed embodiments of the invention, the boat transport wagon comprises a frame structure, a plurality of wheels which co-act with the frame structure and which are allocated one front steerable and load-bearing axle and at least one rear load-bearing axle, at least one support means for supporting the forward part of the boat, and a support means for supporting the stern-part of the boat, wherein the frame structure has a U-shape in the horizontal plane, wherein the outer parts of respective legs co-act with wheels mounted on the rear load-bearing axles whereas a member that interconnects the inner parts of the legs co-acts with wheels mounted on the front, steerable axles, wherein the support

means for supporting the forward or midship region of the boat can be raised and lowered by means of two parallel, hydraulically activatable, side-mounted piston-cylinder devices, and the support means for supporting the stern region of the boat can also be raised and lowered by means of two parallel, hydraulically activatable and side-mounted piston-cylinder devices.

The present invention also utilises the earlier known feature of including in the support means for supporting the forward region and/or midship region of the boat and the support means intended for supporting the stern region of the boat a respective belt, prop, support strap or like device.

In the case of a wagon of this nature, it is also proposed that the leg-interconnecting member is comprised of a number of sub-parts of which at least one can be readily removed, that mutually opposing end regions of said removable sub-parts are provided with first coupling means for co-action with corresponding second coupling means on adjacent leg-related sub-parts of said leg-interconnecting member, and that said second corresponding coupling means are also adapted to form corresponding coupling means between themselves.

According to one embodiment, the interconnecting member has the form of a beam structure.

The first and the second coupling means will conveniently comprise flanges and screw joints.

It is also proposed that each leg and its associated wheels shall be balanced and capable of supporting against an underlying surface in an upright position.

According to another embodiment, telescopically related rods extend parallel with said interconnecting member.

In the case of a divided interconnecting member, the legs can be moved apart or closer together by means of said steerable wheels and with the aid of drive machinery.

It is also proposed that said interconnecting member comprises at least two parallel beam sections that each have a readily removed centre sub-section.

It is specifically proposed by the present invention that a support plate mounted on a boat wagon adapted for the forward region of the hull of the boat shall be mounted on a central or midway sub-part of an interconnecting member and be movable horizontally in the longitudinal extension of said member, so as to be able to move the most forward part of the hull sideways when adjusting the position of the hull with the aid of one or both of said support straps.

It is also proposed to enable the forward part of the boat wagon to be raised and lowered with the aid of side-mounted piston-cylinder devices that act between the front steerable wheels and the wagon frame-structure.

In this latter application, it is proposed that the side-mounted piston-cylinder devices are connected in parallel so that both devices will generate the same pressure forces on the one hand, and so as to provide a pendulating function on the other hand, therewith enabling irregularities in the underlying wagon supporting surface to be compensated for or taken-up without appreciably changing the position of the wagon.

## ADVANTAGES

Those advantages that are primarily characteristic of an inventive boat wagon reside in the provision of conditions which enable the total width of the wagon and the span between the legs of the U-shaped frame structure to be readily adjusted to a width or span suitable for road transport or to a width or span suitable for boat transport, with the aid of a multi-part leg-connecting member.

Another advantage is that the position of the hull of a boat supported by the wagon can be easily adjusted by resting the forward region of the hull on a horizontal support plate which can move along the interconnecting member.

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The primary characteristic features of an inventive method of adjusting the width of a boat wagon are set forth in the accompanying Claim 1, while a wagon or trailer constructed in accordance with the present invention and movable along an underlying wagon supporting surface are set forth in the characterising clause of the accompanying Claim 2.

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## BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described in more detail with reference to an exemplifying embodiment of a boat wagon having features according to the invention, and also with reference to the accompanying drawings, in which

Figure 1 is a simplified side-view perspective illustration of a boat transport wagon that includes front and rear support means and a U-shaped frame structure, said Figure showing the legs of said frame structure adjusted to a wide span for accommodating the hull of a boat;

Figure 2 is a slightly simplified perspective illustration of the wagon shown in Figure 1, but with the legs adjusted to a narrower span so as to obtain a wagon of smaller width suitable for road transport, said smaller span being obtained by removing a sub-part;

Figure 3 illustrates a forward part of the wagon shown in Figure 1 in slightly larger scale; and

Figure 4 illustrates an hydraulic circuit for use with two piston-cylinder devices, each of which is active between a front wheel and the actual frame structure.

## DETAILED DESCRIPTION OF EMBODIMENTS AT PRESENT PREFERRED

Figure 1 illustrates schematically and from one side a boat wagon or boat transporter 2 which is moveable along an underlying surface 1 and which is constructed and adapted for the transportation of a not shown boat (3). The boat wagon 2 comprises a frame structure 4, a number of wheel-pairs which co-act with said frame structure, where the front wheel pair on the left of the Figure has been designated 5, 5′ (each being allocated a front axle) and the two wheel pairs shown to the right of Figure 1 have been designated 6, 6′; 7, 7′, and are each allocated a respective rear axle. The illustrated wagon also includes first support means 8 for supporting the forward

part or midship's part of the boat, and a second support means 9, 9' for supporting the stern part of said boat.

The wagon also includes support means 10, 10' which are mounted midway of the frame structure and which are of the same construction as the support means 9, 9'. These midway support means 10, 10' may also be intended to support the forward part of the boat.

The frame structure 4 has a generally U-shape, where the outer parts 4b (4b') of a respective leg 4 (4a') of the U co-act with respective two wheel-pairs 6, 7 (6', 7').

A part 4d which interconnects the inner parts 4c, 4c' of the legs co-acts with the wheel-pairs 5, 5', which are load-carrying and steerable.

Respective support means 9, 9' or 10, 10' are comprised of two telescopically related props mounted on a respective side of the frame structure and capable of being raised and lowered by means of a respective piston-cylinder device 13, 13' and 14, 14', and further comprise a belt or carrier strap 9a, 10a extending between the props, and arms 13a, 13a' and 14a, 14a' which are rotatably or pivotally mounted in the legs 4a, 4a' of the frame structure and carry respective props.

In the illustrated case, the support means for supporting the forward and/or midship's part of the boat is a two-part structure, of which one part 10 and 10' comprises a belt or a support strap 10a which can be raised and lowered by means of hydraulically activatable, telescopically related posts or props, in the form of two piston-cylinder devices 13, 13', while the other part 8 is comprised of a V-shaped support plate.

The support means 9 and 9' for supporting the stern part of the boat is comprised of a belt (a support strap) 9a whose end-parts co-act fixedly with a respective hydraulically activatable, telescopically related post or prop, in the form of piston-cylinder devices 14, 14', by using known fastener means to this end.

Each prop-functioning hydraulically activatable piston-cylinder device 13 and 13' for the support means 10 and 10' intended for supporting the forward part of the boat are fastened to an outer part of an arm 13a and 13a' pivotally mounted on a respective leg 4a, 4a' of the frame structure 4, said pivotal attachment being located on the forward part of the leg 4a and intended to allow respective arms 13a, 13a' to move horizontally towards and away from the centre line "C" of said frame structure 4. Although not shown in the drawings, support shoulders are provided on the side of respective legs 4a, 4a'.

In the illustrated case, the settings of the pivotal attachment may automatically conform to the width of the hull of the boat, when the arms 10 and 10' are able to move freely in the horizontal plane.

However, one of the arms or both of said arms for one or both of the support means may be locked in a chosen setting, or may be adjustable with the aid of hydraulic auxiliary means not shown.

To enable a boat to be centred on the wagon 2, for instance when taking the boat out of the water, the front and/or the rear arm of the front 10, 10' and rear 9, 9' support means is/are locked on one side of the wagon corresponding to the width of the boat concerned. Alternatively, the construction may be such as to enable one or both arms to be moved

hydraulically away from or towards each other so as to adjust said arms for centring of the hull of the boat in the wagon.

This ensures positive and controlled handling of the boat.

Each of the hydraulic piston-cylinder devices 14 and 14' of the stern-supporting means 9 and 9' is attached to an outer part of an arm 14a and 14a' pivotally mounted midway on respective legs 4a and 4a'.

Figure 1 indicates at 100 a pressure-oil supply system which can be used, among other things, for raising and lowering the telescopic devices 13, 13' and 14, 14'.

The illustrated embodiment of the boat wagon 2 is based on the provision of at least three support means, a support plate 8 adapted for supporting the most forward part of the boat, a support means 9, 9', 9a for supporting the stern part of the boat, and a support means 10, 10', 10a for supporting the midship's part of the boat, including two support means that can be raised and lowered by a respective hydraulically activatable piston-cylinder device. The support plate 8 can not be raised and lowered by means of a piston-cylinder arrangement.

One of said support means, in the illustrated case the forward support means 8, has the form of a support plate 82. The plate 82 is designed to co-act supportingly with the forward part of the keel of the boat, and remaining support means 10, 9 include, among other things, either a belt, a hawser, a cable, a rope, a support strap or the like and co-act with the midship-part and the stern-part of the boat 3.

The support plate 82 functioning as said support means 8 constitutes the most forward support means, although it may be a midship located support means. The support plate 82 has an

upwardly facing, slight V-shape, or some similar shape, for centring the keel of the boat in relation to the wagon.

In the case of the illustrated embodiment, the support means 8 is placed adjacent to and forwardly of the front load-bearing axles.

The illustrated boat wagon 2 is comprised of three mutually co-actable parts, i.e. a front part and the two legs (4a, 4a').

The parts are bolted together at the section lines 20, 21. The wagon can be transported more readily when dismantled. The possibility of dismantling said three parts also facilitates surface treatment of the wagon, among other things.

The loads exerted by the side-mounted lifting devices can be taken-up, by positioning the support plate 82 centrally.

The axles of the wheel pairs 5, 5' are rotatably mounted for rotary movement about a vertical line perpendicular to the centre line "C" and can be locked in a given position by means of said piston-cylinder arrangement.

As shown in Figure 3, the part 4d that interconnects the legs 4a, 4a' may include at least one readily removed central part 31.

The mutually opposite surfaces 31a, 31b of said central part 31 are provided with first coupling means 32, 33 for co-action with corresponding second coupling means 34, 35 belonging to adjacent parts or portions 36, 37 of said interconnecting member 4d.

These second, corresponding coupling means 34, 35 may conveniently be adapted to mutually form corresponding coupling means for direct co-action with each other in the absence of said central part 31, in accordance with the Figure 2 illustration.

The central part 31 and both of the outer parts 36, 37 of the illustrated embodiment have a beam structure, such as a square or rectangular beam structure, preferably a square beam structure.

In the illustrated case, the first and second coupling means have the form of perforated flanges and bolt joints or screw joints that pass through the flange holes.

As will be seen from Figure 3, the interconnecting member 4d conveniently comprises two mutually parallel beam-parts, such as beam-parts 31 and 31', where the latter beam-part is provided with coupling means similar to the former beam-part, said coupling means being referenced 32', 33', 34', 35' in Figure 3.

This embodiment is further based on the concept that each leg-part 4a, 4a' shall be so constructed that its centre of gravity will be supported stably by, *inter alia*, wheel sets, primarily the rear boggy arrangements with wheels placed on respective sides of said leg-parts and on respective sides of the centre of gravity point of the leg-part 4a.

The interconnecting member 4d comprising said parts 31, 36, 37 may be a telescopic structure provided with coupling means different to those described and illustrated.

Rods arranged parallel with said interconnecting parts 31, 31' may also be telescopic.

It will be understood from this that when the parts 31, 31' have been dismantled from the boat wagon 2, according to Figure 1, can the legs 4a, 4a', angled with respect to one another and with respect to the pressure-oil system 100, with the aid of said steerable wheel-pairs 5, 5', be brought closer together to the position shown in Figure 2, whereafter the parts 36 and 37 can be locked together by means of the coupling means 34 and 35.

The U-shaped support plate 82 will also accompany the interconnecting member 31' as said part is removed.

It will be understood from this that when the parts 31, 31' of the interconnecting beams shall be fitted to the wagon 2, as in Figure 1, the legs 4a, 4a', with the aid of said steerable wheel-pairs 5, 5' angled away from each other, and the pressure-oil system 100, shall be brought from one another to the position shown in Figure 1 and there locked together through the medium of the interconnecting parts 31 and 31' and also locked to the outer parts 36, 37 (36', 37') of the interconnecting structures with the aid of said coupling means.

By way of a complementary feature, particularly when the legs 4a, 4a' are not balanced, it is proposed in accordance with the invention that the central interconnecting member 31 is removed and a supportive beam 101 is inserted into the aperture 37a of the hollow beam-part 37 in the direction of the arrow P to an extent in which said supportive beam will also co-act with the beam-part 36.

The central interconnecting member 31' with the support plate 82 is then removed. A further beam 101a can now be inserted into the beam aperture 31a and pushed through the beam-parts.

Subsequent to having positioned the supportive beams 101 and 101a, the legs can be brought together to a position suitable for road transport and fastened together in accordance with the Figure 2 illustration, which shows the supportive beams 101 and 101a removed.

The legs 4a, 4a' are moved wider apart to a boat-transporting position in an opposite sequence of steps, i.e. the two supportive beams 101 and 101a are moved in, the bolt joints released, the legs 4a, 4a' moved apart, one beam 101 removed and the central interconnecting parts 31 fitted, whereafter other supportive beams 101a are removed and the central interconnecting member 31' is fitted.

The support plate 82 is movable parallel with a centre line of the interconnecting member through the medium of a slide surface 81, and the most forward support point of the hull of the boat can be displaced laterally to some extent depending on the setting of said hull in the holders or support means 9, 9' and 10, 10'.

Figure 4 illustrates a hydraulic circuit arrangement for the two forward piston-cylinder devices 5a, 5a', each of which co-acts between the frame-part 4c, 4c' and the wheel-pairs 5, 5', said devices being hydraulically connected in parallel and can therefore both be raised and lowered in response to hydraulic pressure controlled by a valve 40 connected to a pressure source 41.

When the valve 40 is closed, the piston-cylinder devices 5a, 5a' provide for pendular movement which compensates for an uneven ground surface under the same pressure. By pendular movement is meant that hydraulic fluid is pressed from one cylinder to the other cylinder, and vice versa, as the wheel-

pairs 5, 5' run over irregular or uneven underlying surfaces, such as road surfaces.

It will be understood that the invention is not restricted to the aforedescribed and illustrated exemplifying embodiments thereof and that modifications can be made within the scope of the inventive concept as defined in the following Claims.

## CLAIMS

1. A method of adjusting the distance between the legs of a U-shaped boat wagon that comprises two legs and a leg interconnecting part, **characterised** in that said leg-interconnecting member can be shortened and/or lengthened such as to bring said legs to a first span for road transport purposes or to a second span for boat transport purposes.

2. A U-shaped boat wagon which can be pushed or moved along an underlying wagon supporting surface and which includes two legs and a leg-interconnecting part, and with which the horizontal distance or span between said legs can be adjusted, **characterised** in that the leg-interconnecting member is comprised of a number of elements that co-act removably with each other and/or telescopically with each other, wherein the span of the legs is adapted for road transport by removing one or more of said removable elements and/or by telescoping said elements together, and wherein the legs can be adjusted to a second span for boat transport, by fitting one or more removable elements and/or telescopically expanding said elements.

3. A boat wagon which can be pushed or moved along an underlying wagon supporting surface and which comprises a frame structure a number of wheels which co-act with said frame structure and which are provided with front, steerable and load-bearing axles and rear load-bearing axles, support means for supporting the forward part of the boat, and support means for supporting the stern part of the boat, said frame structure having a U-shape in a horizontal plane, wherein the outer parts of respective legs co-act with said wheels mounted on the rear load-bearing axles, whereas a leg interconnecting member co-acts with said wheels mounted on the front, steerable axles, **characterised** in that said leg-interconnecting member is

comprised of a number of sub-parts of which at least one is comprised of a readily removed element; in that mutually opposite end-parts of said removable element are provided with first coupling means for co-action with corresponding second coupling means belonging to adjacent sub-parts of said leg-interconnecting member; and in that said second corresponding coupling means are also adapted to mutually form corresponding coupling means therebetween.

4. A wagon according to Claim 3, **characterised** in that said leg-interconnecting member is comprised of a beam structure.

5. A wagon according to Claim 3 or Claim 4, **characterised** in that said first and said second coupling means are comprised of flanges and screw joints.

6. A wagon according to Claim 1, **characterised** in that each leg with associated wheels is balanced as a unit.

7. A wagon according to Claim 2, **characterised** by telescopic rods extending parallel with said leg-interconnecting part.

8. A wagon according to Claim 2, **characterised** by mechanical drive means which enable the legs to be moved closer together or wider apart with the aid of said steerable wheels.

9. A wagon according to Claim 2, **characterised** in that said leg-interconnecting member is comprised of at least two mutually parallel beam-parts.

10. A wagon according to Claim 2, **characterised** in that said wagon includes a support plate which supports the forward region of the boat and which can be moved in a direction adapted to a centre line on the leg-interconnecting member.

11. A wagon according to Claim 10, **characterised** in that each of the front wheels is supported by a piston-cylinder device which is active between said wheels and the frame structure of said wagon.

12. A wagon according to Claim 10 or Claim 11, **characterised** in that said two piston-cylinder devices are hydraulically connected in parallel.

13. A wagon according to Claim 12, **characterised** in that the volume of the hydraulic fluid in said piston-cylinder devices is enclosed through the medium of valve means such as to allow pendular movement.

14. A boat transportation wagon that can be pushed or moved along an underlying support surface and that includes a frame structure, a number of wheels which co-act with said frame structure and which are mounted on front steerable and load-bearing axles and rear load-bearing axles, a support means for supporting the forward region of the boat, a support means for supporting the rear region of the boat and the midship region of said boat, wherein said frame structure is U-shaped in the horizontal plane, wherein the outer parts of respective legs of said U co-act with the wheels belonging to the rear load-bearing axles, and wherein an interconnecting member that interconnects the inner parts of said legs co-acts with wheels mounted on the front steerable axles, **characterised** in that a support plate which supports the forward end of the boat is mounted for movement in a direction adapted to a centre line on said interconnecting member.

15. A wagon according to Claim 14, **characterised** in that each of said front wheels is supported by a piston-cylinder device that acts between said wheels and said wagon frame-structure.

16. A wagon according to Claim 15, **characterised** in that said two piston-cylinder devices are connected hydraulically in parallel.

17. A wagon according to Claim 16, **characterised** in that the volume of the hydraulic fluid in said piston-cylinder devices is enclosed through the medium of valve means such as to allow pendular movement.

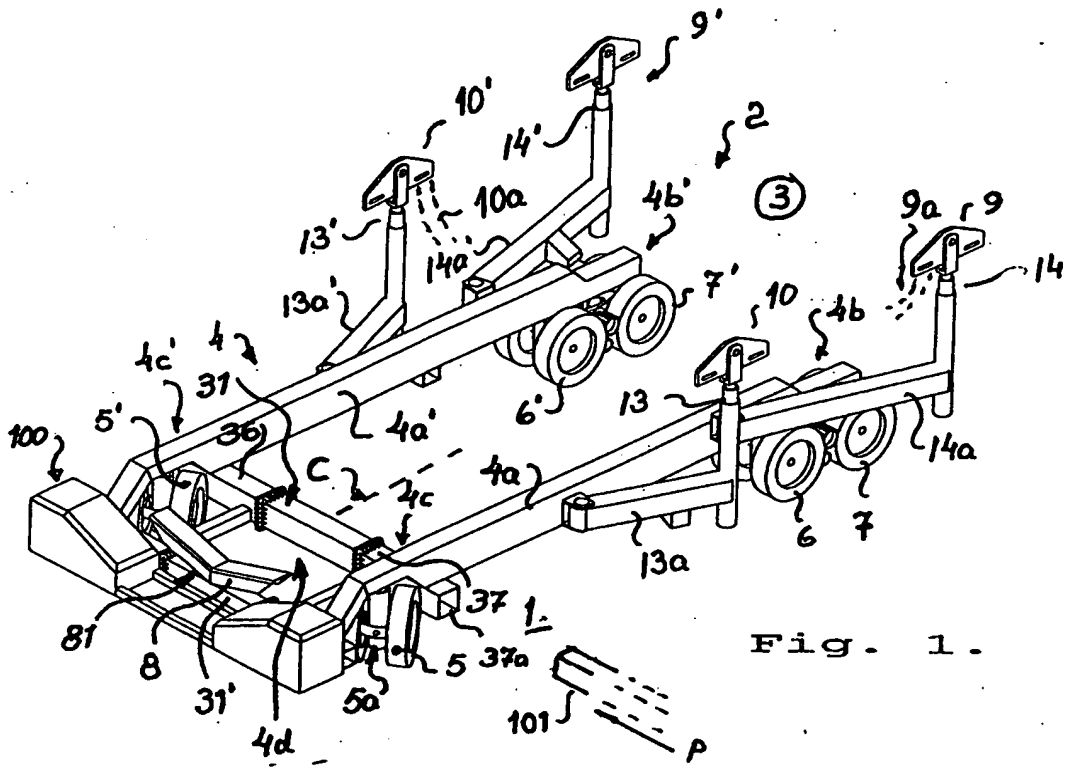
9'
10'
14'
2
10a
4b'
3
9a
9
13'
14a
14
13a'
7'
10
4b
4c'
4
31
5'
36
4a'
6'
13
100
C
4c
4a
14a
6
7
13a
37
1
81
8
5
37a
31'
5a
101
4d
P

Fig. 1.

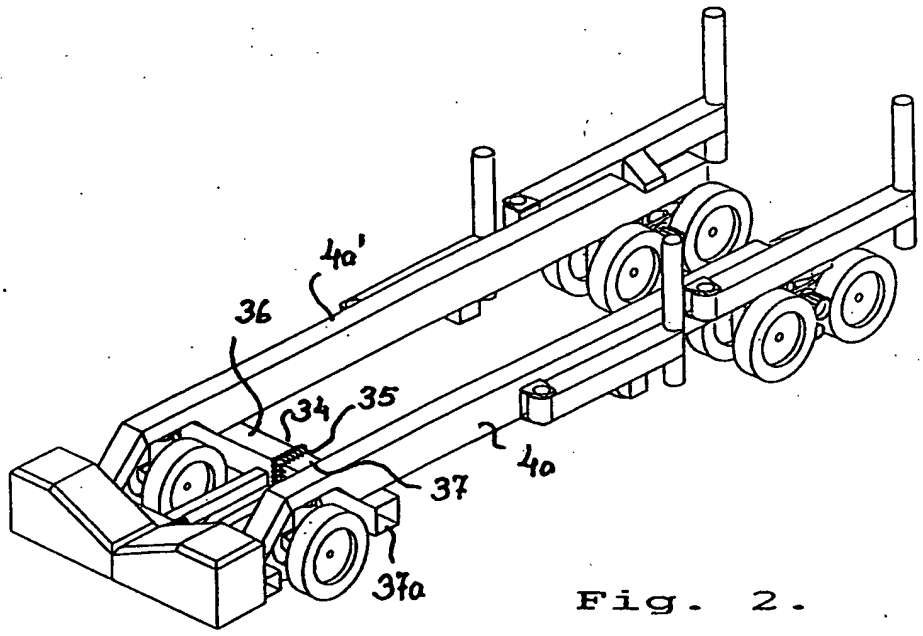
4a'
36
34
35
4a
37
37a

Fig. 2.

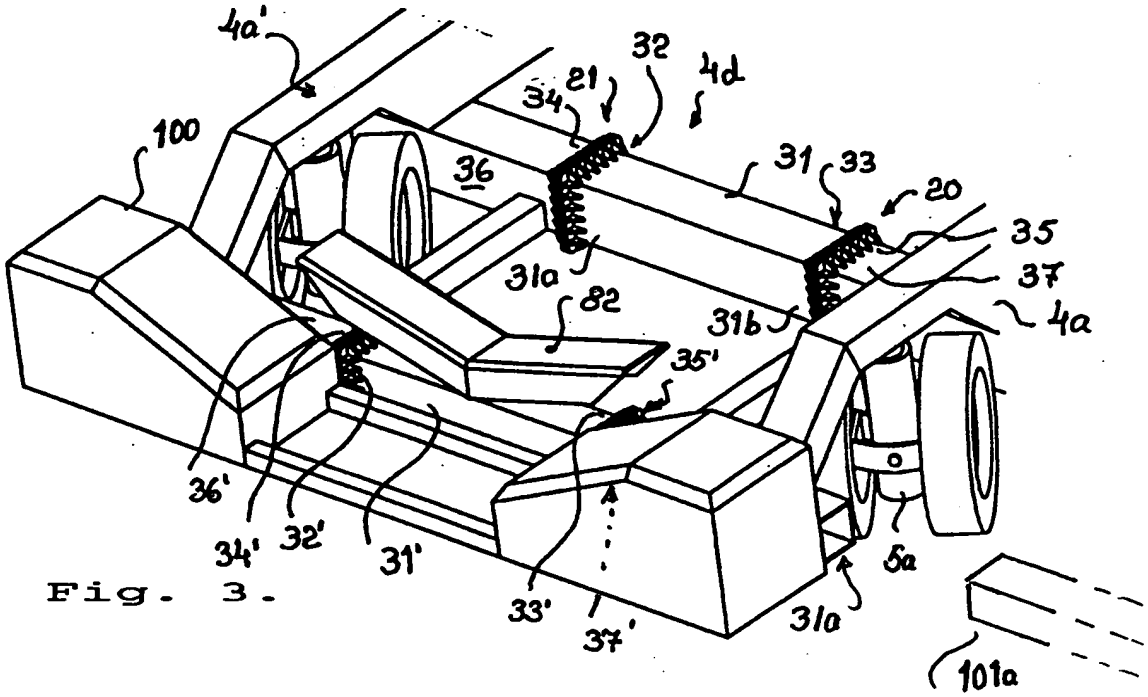
4a'
100
32
4d
21
34
36
31
33
20
35
31a
37
82
31b
4a
35'
36'
34'
32'
31'
33'
37'
31a
5a
101a

Fig. 3.

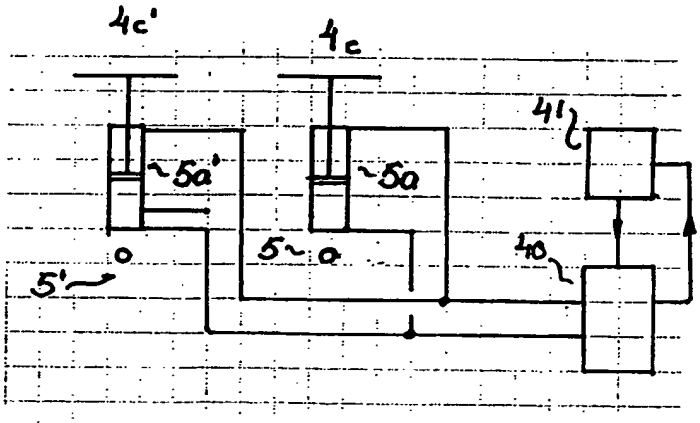
4c'
4c
41
5a'
5a
5'
5a
40

Fig. 4.

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 99/00639

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B60P 3/10, B63C 3/12
According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: B60P, B63C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X | US 4232879 A (BOXRUD), 11 November 1980 (11.11.80), figure 1, abstract | 1-5,7-9 |
| Y | | 10-13 |
| | -- | |
| X | US 3572743 A (EDWARD L. PARR), 30 March 1971 (30.03.71), column 2, line 56 - line 63; column 3, line 39 - line 50, figure 1, abstract | 1-5,7-9 |
| Y | | 10-13 |
| | -- | |
| X | SE 465026 B (INGMAR GRANLIND), 15 July 1991 (15.07.91), page 9, line 5 - line 9 | 14 |
| Y | | 10-13,15-17 |
| | -- | |

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" erlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 13 August 1999 | 01 -09- 1999 |
| Name and mailing address of the ISA:<br>Swedish Patent Office<br>Box 5055, S-102 42 STOCKHOLM<br>Facsimile No. +46 8 666 02 86 | Authorized officer<br>Hans Nordström<br>Telephone No. +46 8 782 25 00 |

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 99/00639

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| Y | WO 8700807 A1 (GLEONEC), 12 February 1987 (12.02.87), page 6, line 25 - page 7, line 23, figure 10 -- | 10-13,15-17 |
| Y | EP 0566545 A2 (BOTTERO, GIORGIO), 20 October 1993 (20.10.93), column 3, line 44 - column 4, line 20, figure 10 -- | 10-13,15-17 |
| A | US 2644176 A (C.R. LIVERMON), 7 July 1953 (07.07.53) -- | 1-13 |
| A | US 4664401 A (CARRICK), 12 May 1987 (12.05.87) -- | 1-13 |

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# INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE99/00639

**Box I** Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box II** Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

A method and a U-shaped boat wagon according to claims 1-13 in which a leg-interconnecting member can be shortened and/or lengthened

A boat transportation wagon according to claims 14-17 in which a support plate is movably mounted

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

# INTERNATIONAL SEARCH REPORT

Information on patent family members

01/07/99

International application No.
PCT/SE 99/00639

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| US 4232879 A | 11/11/80 | NONE | |
| US 3572743 A | 30/03/71 | NONE | |
| SE 465026 B | 15/07/91 | SE 8902320 A | 28/12/90 |
| WO 8700807 A1 | 12/02/87 | EP 0232350 A | 19/08/87 |
| | | FR 2585662 A,B | 06/02/87 |
| EP 0566545 A2 | 20/10/93 | AT 161425 T | 15/01/98 |
| | | CA 2131551 A | 16/09/93 |
| | | DE 69315993 D,T | 02/07/98 |
| | | EP 0632727 A,B | 11/01/95 |
| | | IT 228152 Y | 05/02/98 |
| | | IT 1262896 B | 22/07/96 |
| | | IT FI920058 D,U,V | 15/10/93 |
| | | JP 7504423 T | 18/05/95 |
| | | WO 9317712 A | 16/09/93 |
| US 2644176 A | 07/07/53 | NONE | |
| US 4664401 A | 12/05/87 | NONE | |